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Wet soils and potential compaction

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Wet soils and potential compaction

by Mahdi Al-Kaisi, Department of Agronomy

The wet weather presents several challenges to accomplishing fieldwork this season. Whether it is planting beans or corn, cultivating, or rotary hoeing, there is high potential to cause significant damage to soil structure. So before rushing out to the field on the first few days of dry weather, you need to do a risk assessment of working the ground. When soil moisture is at or exceeds field capacity, there is an increased potential for soil compaction, particularly at topsoil depths. The general rule is to minimize traffic on the field that would increase soil compaction.

Field operations will not achieve their objectives if the soil moisture conditions are not suitable. The decision to perform any field operation this season should be justified and weighed against disadvantages or damage to the soil structure. Soil compaction is a particular concern because the impact is significant when the soil's physical and chemical properties, such as infiltration rate, bulk density, and nutrient availability, are altered.



Wet conditions and potential soil compaction. (Mahdi Al-Kaisi)

The link between soil moisture and changes in soil physical properties is essential. The degree of soil wetness changes the proportional relationships of air (void spaces in the soil system) to water. The increase of one of the portions over another affects the rest of the soil's physical properties, such as bulk density, infiltration rate, and soil elasticity. The continual rainfall has the effect of filling voids with additional water, leading to potential nitrate leaching.

The impact of wet conditions on soil physical and chemical properties is also a function of soil texture. Well-drained, medium-textured soils (loams, clay loams, silt loams, and silty clay loams) are much less affected than fine-textured soils (silty clay and clay), where saturated

conditions are likely to exist due to poor drainage. The wet soil conditions of poorly drained soils may persist longer, depending on drainage availability, causing significant challenges for increasing potential soil compaction and corn germination if planting and other field operations are rushed.

Cultivation helps break up crusted soils and speeds warming and drying of the soil surface. However, the potential for soil compaction is at its highest when the soil is just dry enough to work without getting stuck.

In other words, a half-day's wait can pay off in the long run.

Check soil moisture

It is important to check for proper soil moisture conditions prior to implementing any field operation. Most of Iowa's soils have medium textures. For these soils, a simple method of checking soil moisture is the "feel" method. Probing the top 3-4 feet with a hand soil probe to assess the field's soil moisture conditions is time well spent.

Check the soil moisture status by pushing a ribbon of soil from between the thumb and index finger.

If it breaks off within 1 or 2 inches, the potential for creating compaction is less. However, if the ribbon stretches out to 4 or 5 inches, it is still too wet and plastic. The chances are good that being in the field under these conditions may cause more problems than it will solve.

Another method is to make a ball of soil 2 inches in diameter and toss it through the air. If it hangs together until impact, it has a lot of cohesiveness, is still fairly plastic, and probably is too wet to work the ground.

Right now is also a good time to evaluate fields to see whether drainage systems are working properly, especially for poorly drained and fine-textured soils. Keeping records on field moisture conditions can help in planning drainage system improvements, if needed. Keeping field records on soil moisture conditions is as important as recording information about soil fertility, insects, and management practices. These records help explain yield variability across the field.

However, under the current prevailing wet conditions, the best choice producers can make is to stay away from the field--avoid traffic on wet soil to reduce soil compaction.

Mahdi Al-Kaisi is an associate professor in agronomy with research and extension responsibilities in soil management and environmental soil science.

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